

Silicon-Carbide (SiC) Multichip Power Modules (MCPMS) For Power Building Block Applications, Phase II

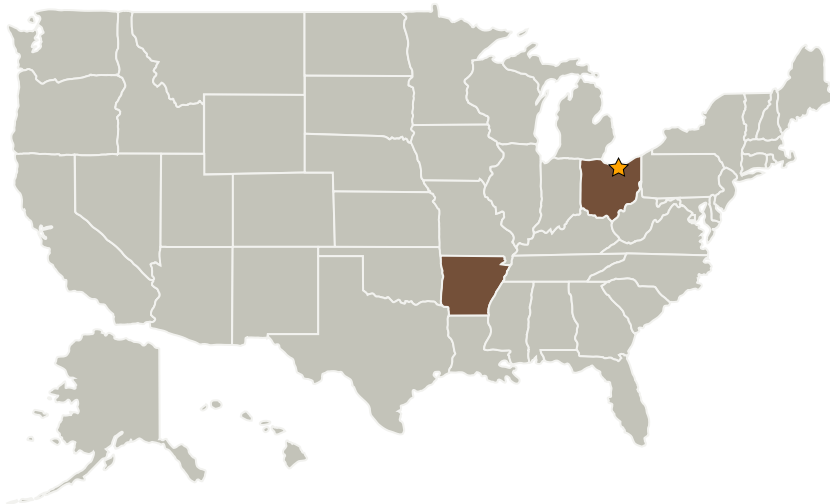
Completed Technology Project (2005 - 2007)



Project Introduction

In Phase I, APEI, Inc. proved the feasibility of developing a modular, expandable and fault tolerant SiC-based power system through the successful demonstration of a four-module SiC-based power system capable of dynamic reconfiguration allowing the system to continue delivering power to the load without interruption in the event of a module failure. These results show the feasibility of developing miniaturized SiC multichip power modules (MCPMs) to form a core power building block component. The MCPM building blocks utilize a distributed control and communications structure, with a communications network established between the core silicon-on-insulator (SOI) controllers of the MCPMs, but with no single controller in command of the system. The decentralized control and modular approach allow for the construction of highly flexible, auto-configurable, stackable power systems to be connected in series and/or parallel to increase overall system power handling capabilities. Moreover, the identical core MCPM building blocks could be used in many power electronics applications, while various specific functions such as source regulation, energy storage regulation, and motor drives could be achieved by the use of external components. In addition, the development of high-temperature MCPMs allows high levels of miniaturization, power density, and efficiency resulting in highly reliable, compact, modular, and inexpensive power systems.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Arkansas Power Electronics International, Inc.	Supporting Organization	Industry	Fayetteville, Arkansas

Primary U.S. Work Locations	
Arkansas	Ohio

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
 - └ TX11.1 Software Development, Engineering, and Integrity
 - └ TX11.1.6 Real-time Software